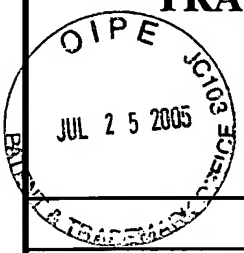
TRANSMITTAL FORM



Application No.:	10/010,778
Filing Date:	December 6, 2001
First Named Inventor:	Jack Harwood
Confirmation No.:	5871
Group Art Unit	2151
Examiner:	Tran, Nghi V.
Customer No.	24227
Docket No.	EMC-01-217 [previously EMC-01-087CIP(A)]

Total Number of Pages in this Submission: 17

ENCLOSURES *(check all that apply)*

- ☒ **Authorization for the Commissioner to charge Deposit Account No. 05-0889 for fees associated with this transaction (in duplicate)**
- ☒ **Amendment/Response**
  - ☒ After Final (Copy)
  - ☐ Affidavits/Decl.
- ☐ Extension of Time Request for Months
- ☒ **Request for Continued Examination Transmittal**
- ☐ Information Disclosure Statement
- ☐ Response to Missing Parts/Incomplete Application
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- ☐ Formal Drawings
- ☐ Letter to Official Draftsperson with ( ) sheets of redlined changes to drawings
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- ☐ Certified Copy of Priority Document(s)
- ☐ Additional Enclosures:
- ☐ Petition for Revival of an Unintentionally Abandoned Application [37 CRF 1.137(b)] (in duplicate)
- ☐ Associate Power of Attorney
- ☐ Form PTOL-85B, Part B -Issue Fee Payment Transmittal," (in duplicate)
- ☐ Express Abandonment Request
- ☐ Terminal Disclaimer
- ☐ Status Inquiry
- ☒ **Fee Transmittal (in duplicate)**
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SIGNATURE OF APPLICANT, ATTORNEY OR AGENT

7-22-05
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PATENT
EMC-01-217
Previously EMC-01-087CIP(A)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Harwood, et al.	*GROUP ART UNIT:*	2151
U.S.S.N.:	10/010,778	*CONFIRMATION NO.:*	5871
FILING DATE:	December 6, 2001	*EXAMINER:*	Tran, Nghi V.
		CUSTOMER NO.	**24227**
TITLE:	*NETWORK ADAPTER HAVING INTEGRATED SWITCHING CAPABILITIES AND PORT CIRCUITRY THAT MAY BE USED IN REMOTE MIRRORING*		

CERTIFICATE OF MAILING UNDER 37 C.F.R. §1.8(a)

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AMENDMENT AFTER FINAL

Sir:

This is in response to the Office Action made final mailed on May 16, 2005. Please note that there has been a change in the attorney docket number from EMC-01-087CIP(A), to EMC-01-217.

Enclosed with this response is a statement of power of attorney pursuant to 37 CFR § 3.73(b) and a Customer Number Association Request.

Please amend the subject application, as follows:

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks begin on page 9 of this paper.

In the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the Application.

Listing of Claims:

1. (Currently amended) A network adapter capable of being used to interface to a network environment a data storage system input/output (I/O) controller, the data storage system I/O controller residing in a first network data storage system, the network environment being external to the network data storage system, the network adapter comprising:

an interface capable of being used to couple the network adapter to the data storage system I/O controller via a backplane in the first data storage system, the interface comprising ~~two~~ first and second ~~sets of~~ data and control/management interfaces, thereby enabling multiple processing elements within the data storage system I/O controller to interact with respectively connected elements within the network adapter;

a switching system capable of being coupled to data exchanging devices in the network environment, the switching system being coupled to the data storage system I/O controller via the first data and control/management interface ~~when the one or more interfaces couple~~ on the network adapter ~~to the data storage system I/O controller~~; and

port circuitry capable of being used to facilitate establishment of a link between the first network data storage system and a second network data storage system in the network environment, the second network data storage system being remote from the first network data storage system, the link, when established, facilitating establishment of a target device in the second network data storage system as a data mirroring device capable of comprising a mirror of

data residing in a source device in the first network data storage system, said port circuitry being connected to the data storage system I/O controller via the second data and control/management interface on the network adaptor.

2. (Previously presented) The network adapter of claim 1, wherein the switching system comprises a fibre channel switching fabric.

3. (Previously presented) The network adapter of claim 1, wherein the network adapter is an electrical circuit card that is configured to be electrically and mechanically coupled to the backplane.

4. (Currently amended) A circuit card configured to be inserted into and received by a circuit card slot in a first network data storage system, the circuit card comprising:

an interface capable of being coupled via signal transmission system of the first network data storage system to an input/output (I/O) controller of the first network data storage system when the circuit card is inserted into the circuit card slot, the interface comprising ~~two~~ first and second ~~sets of~~ data and control/management interfaces, thereby enabling multiple processing elements within the data storage system I/O controller to interact with respectively connected elements within the network adapter;

a switch that may be coupled to data exchanging devices external to the circuit card and the first network data storage system, and that may be coupled to the I/O controller via the first

data and control/management interface when the circuit card is inserted into the circuit card slot; and

port circuitry that may be used to facilitate establishment of a link between the first network data storage system and a second network data storage system, the link, when established, facilitating data transmission from a source device to a target device, the source device being in the first network data storage system, the target device being in the second network data storage system and being used to mirror data residing in the source device, said port circuitry being connected to the data storage system I/O controller via the second data and control/management interface on the network adaptor.

5. (Previously presented) The circuit card of claim 4, wherein the switch comprises a fibre channel switch.

6. (Original) The circuit card of claim 4, wherein the source device and the target device comprise respective logical data volumes.

7. (Previously presented) The network adapter of claim 1, wherein the source device and the target device comprise respective logical data volumes.

8. (Original) The circuit card of claim 4, wherein the second network data storage system is geographically remote from the first network data storage system.

9. (Currently amended) A method of using a network adapter that may be used to interface to a network environment a data storage system input/output (I/O) controller, the data storage system (I/O) controller residing in a first network data storage system, the network environment being external to the first network data storage system, the network adapter including an interface, a switching system, and port circuitry, the method comprising:

coupling the interface to the data storage system (I/O) controller via a backplane in the first network data storage system, the interface comprising ~~two~~ first and second ~~sets of~~ data and control/management interfaces, thereby enabling multiple processing elements within the data storage system I/O controller to interact with respectively connected elements within the network adapter;

coupling the switching system to data exchanging devices in the network environment, the switching system being coupled to the data storage system (I/O) controller when the interface couples the adapter to the data storage system (I/O) controller via the first data and control/management interface; and

using the port circuitry to facilitate establishment of a link between the first network data storage system and a second network data storage system in the network environment, the second network data storage system being remote from the first network data storage system, the link, when established, facilitating establishment of a target device in the second network data storage system as a data mirroring device that may comprise a mirror of data residing in a source device in the first network data storage system, said port circuitry being connected to the data storage system I/O controller via the second data and control/management interface on the network adaptor.

10. (Original) The method of claim 9, wherein the switching system comprises a fibre channel switching fabric.

11. (Previously presented) The method of claim 9, wherein the network adapter is an electrical circuit card that is configured to be electrically and mechanically coupled to the backplane.

12. (Currently amended) A method of using a circuit card configured to be inserted into and received by a circuit card slot in a first network data storage system, the circuit card including an interface, a switch, and port circuitry, the method comprising:

coupling the interface via signal transmission system of the first network data storage system to an input/output (I/O) controller of the first network data storage system when the circuit card is inserted into the circuit card slot, the interface comprising ~~two~~ first and second ~~sets of~~ data and control/management interfaces, thereby enabling multiple processing elements within the data storage system I/O controller to interact with respectively connected elements within the network adapter;

coupling the switch to data exchanging devices external to the circuit card and the first network data storage system, and the switch also being coupled to the I/O controller via the first data and control/management interface when the circuit card is inserted into the circuit card slot; and

using the port circuitry to facilitate establishment of a link between the first network data storage system and a second network data storage system, the link, when established, facilitating data transmission from a source device to a target device, the source device being in the first network data storage system, the target device being in the second network data storage system and being used to mirror data residing in the source device, said port circuitry being connected to the data storage system I/O controller via the second data and control/management interface on the network adaptor.

13. (Previously presented) The method of claim 12, wherein the switch comprises a fibre channel switch.

14. (Original) The method of claim 12, wherein the source device and the target device comprise respective logical data volumes.

15. (Original) The method of claim 9, wherein the source device and the target device comprise respective logical data volumes.

16. (Original) The method of claim 12, wherein the second network data storage system is geographically remote from the first network data storage system.

REMARKS

Applicant expresses appreciation to the Examiner for consideration of the subject patent application. This amendment is in response to the Office Action mailed May 16, 2005 wherein claims 1-16 were rejected. The claims have been amended and the following remarks have been prepared to address the concerns raised by the Examiner.

Claims 1-16 remain in this application. Claims 1, 4, 9 and 12 have been amended without narrowing the scope of the claims in order to clarify that which Applicants consider to be the invention. Applicants submit that the remaining claims are in condition for allowance and respectfully requests further examination of pending claims 1-16.

Claim Rejections - 35 U.S.C. § 103

Claims 1-16, including independent claims 1, 4, 9, and 12, were rejected under 35 U.S.C. § 103(a) as being obvious over a combination of U.S. Pat. No. 6,643,795 ("Sicola") and U.S. Pat. No. 6,542,954 ("Aruga").

All of the independent claims have been amended to recite that the switching system or switch is coupled to the data storage system I/O controller via the first data and control/management interface of the network adapter, and that the port circuitry is connected to the same data storage system I/O controller via the second data and control/management interface of the network adapter. For example, the claimed invention allows data to be sent from a host computer into a network card, through a switching system, and out to multiple data storage

systems without having to go back through the switching network or using bandwidth on regular host/network communication paths.

Neither Sicola nor Aruga discloses or suggests the claimed invention.

Sicola teaches a data mirroring system having a redundant configuration. The system includes dual Fiber Channel fabric links that connect two data storage sites, wherein each site has a host computer and associated data storage array, with redundant controllers and adapters (see abstract). The architecture of this system requires data to travel back and forth through the switched fabric and corresponding controllers thereby requiring excess processing steps.

For example, a typical write command in Sicola sends information from the host, to the host controller via the switched fabric, and the host controller then sends the information to the proximate storage device. In order to store this information to the remote site the host controller then sends the information back through the switching system to another host controller, which then sends the data to the remote storage device (see column 12 lines 11-38, note: similar steps are taken throughout the asynchronous operation, only delayed after being stored to cache). This process would require more processing resources and bandwidth because the data must travel through the entire system twice.

Accordingly, Sicola lacks a network adapter that not only couples a data storage system I/O controller to a switching system or switch via a first data and control/management interface, but also connects the same controller to port circuitry via a second data and control management interface, as required by the claims.

Aruga does not provide what is missing in Sicola. Examiner argues that Aruga specifies two sets of control/management interfaces and allows direct connection to disk drive units

pointing to column 4 line 29. This particular section refers to the ability to connect a controller to a storage device directly without using proprietary Fibre Channel fabric switches enabling different protocol options. However, Aruga's system does not provide a network adapter that not only couples a data storage system I/O controller to a switching system or switch via a first data and control/management interface, but also connects the same controller to port circuitry via a second data and control management interface, as required by the claims. In fact, the point of Aruga is to enable "one-to-one" connectivity between controllers and disk drive units (see abstract).

Applicant respectfully submits that the cited combination does not teach, suggest, or otherwise motivate someone with ordinary skill in the art to create the present invention as recited in Applicant's independent claims 1, 4, 9 and 12. Applicant further submits that all claims stand ready for allowance.

Applicant respectfully submits that dependent claims 2, 3, 5-8, 10, 11 and 13-16, being respectively dependent on independent claims 1, 4, 9 and 12, are allowable for the same reasons.

CONCLUSION

In view of the foregoing, the applicants' believe that the application is in condition for allowance and respectfully request favorable reconsideration.

In the event the Examiner deems personal contact desirable in the disposition of this case, the Examiner is invited to call the undersigned attorney at (508) 293-7074.

Please charge all fees occasioned by this submission to Deposit Account No. 05-0889.

Respectfully submitted,

Dated: 6-29-05

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